

REMARKS

In the Office Action, the Examiner rejected claims 5-12 under 35 U.S.C. § 103(a) as being unpatentable over Ohuchi (U.S. Patent No. 6,762,468) in view of Verret (U.S. Patent No. 6,130,144) and Bar-Gadda (U.S. Patent No. 6,579,805); and rejected claims 13-19, also under 35 U.S.C. § 103(a), as being unpatentable over the admitted prior art of Fig. 26 (APA) in view of Verret and Bar-Gadda.

Claims 1-19 remain pending, and claims 1-4 previously have been withdrawn from consideration as directed to a non-elected invention.

Applicants respectfully traverse the claim rejections under 35 U.S.C. § 103(a), because a *prima facie* case of obviousness has not been established.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

M.P.E.P. § 2143 (8th ed., revised on Aug. 2005).

Claims 5-12

The rejection of claims 5-12 under 35 U.S.C. § 103(a) as unpatentable over Ohuchi in view of Verret and Bar-Gadda is improper, at least because Ohuchi, Verret, and Bar-Gadda, taken alone or in combination, fail to teach or suggest each and every element of these claims.

Claim 5 calls for a method of manufacturing a semiconductor device that includes, for example, “thermal-oxidizing the conductive film in an atmosphere that contains an oxidant for oxidizing the first semiconductor and a reductant for reducing the second semiconductor, to form an oxide film made of the first semiconductor on the conductive film.”

The Examiner cited Ohuchi as a teaching of “an oxidation condition such that silicon in the SiGe gate electrode is **selectively oxidized** to form oxide sidewalls 12.” Office Action, p. 3 (emphasis in original). The Examiner, however, acknowledged that Ohuchi fails to disclose “thermal-oxidizing the conductive film in an atmosphere that contains an oxidant for oxidizing the first semiconductor and a reductant for reducing the second semiconductor, to form an oxide film made of the first semiconductor on the conductive film,” as recited in claim 5. See *Id.*

The Examiner then relied on Verret to cure Ohuchi’s deficiencies regarding claim 5. The Examiner cited Verret as a teaching of “performing the selective oxidation in steam.” *Id.* Even assuming the Examiner’s characterization of Verret is correct, this still does not constitute a teaching of “thermal-oxidizing the conductive film in an atmosphere that contains an oxidant for oxidizing the first semiconductor and a reductant for reducing the second semiconductor, to form an oxide film made of the first semiconductor on the conductive film,” as recited in claim 5.

Contrary to the Examiner’s assertion that because Verret discloses a steam oxidation step, “one of ordinary skill in the art would readily recognize that in order to achieve Ohuchi’s selective oxidation, the oxidation condition would have been steam,” *Id.*, steam, although preferred, is not required in the oxidization process in Verret.

Verret, col. 5, lines 14-16. More importantly, nowhere in Verret teaches or suggests that steam is used for “thermal-oxidizing the conductive film in an atmosphere that contains an oxidant for oxidizing the first semiconductor and a reductant for reducing the second semiconductor, to form an oxide film made of the first semiconductor on the conductive film,” as recited in claim 5.

Finally, to cure the deficiencies of Ohuchi and Verret, the Examiner cited Bar-Gadda as a teaching of “steam for use in an oxidation process for producing silicon dioxide is generated by admitting H₂ and O₂ into an oxidation chamber,” as “a factual evidence showing the fact the oxidation atmosphere of steam of combined process of Ohuchi and Verret contains both oxidant (H₂O) and reductant (H₂).” Office Action, pp. 3-4.

Even assuming the Examiner’s characterization of Bar-Gadda is correct, Bar-Gadda fails to cure the deficiencies of Ohuchi and Verret, because Bar-Gadda also fails to teach or suggest “thermal-oxidizing the conductive film in an atmosphere that contains an oxidant for oxidizing the first semiconductor and a reductant for reducing the second semiconductor, to form an oxide film made of the first semiconductor on the conductive film,” as recited in claim 5. For example, Bar-Gadda only teaches a process for oxidizing silicon, without any reference to a second semiconductor, let alone “a reductant for reducing the second semiconductor,” as recited in claim 5. Therefore, Bar-Gadda also fails to teach or suggest at least the above-quoted element of claim 5.

Accordingly, Ohuchi, Verret, and Bar-Gadda, taken alone or in combination, fail to teach or suggest each and every element of claim 5. For at least this reason, Ohuchi, Verret, and Bar-Gadda therefore fail to support a *prima facie* case of

obviousness. The rejection of claim 5, and dependent claims 6-9, under 35 U.S.C. §103 as being obvious from Ohuchi in view of Verret, and Bar-Gadda is thus improper and should be withdrawn.

Moreover, Applicant disagrees with the Examiner's assertion that "[i]t would have been obvious to modify Ohuchi's teaching by performing the selective oxidation in steam as suggested by Verret because it is well settle[d] that the selection of a known material (i.e. steam) based on its **suitability** recognized in the art for its intended use supported a *prima facie* obviousness determination (MPEP 2144.07)." Office Action, p. 3 (emphasis added). Contrary to the requirements of MPEP 2144.07, Verret fails to teach or suggest any suitability of steam for "thermal-oxidizing the conductive film in an atmosphere that contains an oxidant for oxidizing the first semiconductor and a reductant for reducing the second semiconductor, to form an oxide film made of the first semiconductor on the conductive film," as recited in claim 5.

In fact, Verret specifically teaches away from the method taught by claim 5. For example, contrary to "an atmosphere that contains . . . a reductant for reducing the second semiconductor," as recited in claim 5 (emphasis added), Verret teaches a different oxidation step where "the oxide (SiO₂) layer 36 is formed by consuming the Si of the Si_xGe_{1-x} alloy 32 without substantially disturbing the Ge in the Si_xGe_{1-x} alloy underneath thereby forming a thin layer of essentially pure Ge 34." Verret, col. 5, lines 10-14 (emphasis added). Therefore, the Examiner fails to establish the suitability required by MPEP 2144.07 to support a *prima facie* obviousness determination. Accordingly, for this additional reason, the rejection of claim 5, and dependent claims 6-

9, under 35 U.S.C. §103 as being obvious from Ohuchi in view of Verret, and Bar-Gadda is improper and should be withdrawn.

In addition, claim 10 calls for a method of manufacturing a semiconductor device that includes, for example, “thermal-oxidizing the gate electrode in an atmosphere that contains an oxidant for oxidizing Si and a reductant for reducing Ge to form a sidewall insulating film on a sidewall surface of the gate electrode.” For the reasons set forth above regarding claim 5, Ohuchi, Verret, and Bar-Gadda, taken alone or in combination, fail to teach or suggest at least this element of claim 10. Independent claim 10 and its dependent claims 11-12 are therefore allowable under 35 U.S.C. § 103(a).

Claims 13-19

The rejection of claims 13-19 under 35 U.S.C. § 103(a) as unpatentable over APA in view of Verret and Bar-Gadda is also improper, at least because APA, Verret, and Bar-Gadda, taken alone or in combination, fail to teach or suggest each and every element of these claims.

Independent claim 13 calls for a method of manufacturing a semiconductor device that includes, for example, “thermal-oxidizing the monocrystal layer in an atmosphere that contains an oxidant and a reductant as an oxidation seed to form an oxide film made of one of said at least two kinds of semiconductors on a surface of the monocrystal layer.”

As the Examiner correctly recognized, “[t]he admitted prior art APA differs from the claims in that while the admitted prior art forms the gate insulating film by conventional oxidation process that results in a gate oxide film containing SiO₂ and GeO₂, the claims call for an oxidation process in an atmosphere that contains an

oxidant for oxidizing Si and a reductant for reducing Ge so that the gate insulating film is made of substantially silicon oxide." Office Action, p. 5. In other words, APA fails to teach or suggest at least the above-quoted element of claim 13.

For the reasons similar to those set forth above regarding claim 5, Verret and Bar-Gadda also fail to teach or suggest at least the above-quoted element of claim 13, and therefore fail to cure the deficiencies of APA. Independent claim 13 is thus allowable and so are claims 14-16, which depend from claim 13.

Finally, independent claim 17 recites, *inter alia*, "wherein the gate insulating film is formed on a surface of the SiGe monocrystal layer by thermal-oxidizing the SiGe monocrystal layer in an atmosphere that contains an oxidant for oxidizing Si, and a reductant for reducing Ge, and the gate insulating film is made of substantially silicon oxide." For the reasons similar to those set forth above regarding claims 5, 10, and 13, neither APA, Verret, and Bar-Gadda, nor their combination, teaches or suggests at least this element of claim 17. Independent claim 17 and its dependent claims 18-19 are thus allowable.

Conclusion

In view of the foregoing, Applicant requests reconsideration of the application and timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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Dated: December 28, 2005

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